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Structure and Properties of (La2−xSrx)MnO4 Compounds

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Abstract

Polycrystalline single phase (La2-xSrx)MnO4 (1.10≤x≤1.40) samples were prepared by a citrate precursor method. They have tetragonal K2NiF4 structure with a space group of 14/mmm, increasing x, unit-cell a-axis increases and c-axis decreases, which is a result of decreasing of the Jahn-Teller effect due to the increase of the Mn(IV) ion. Spin glass state exists at low temperature and a hump observed from the susceptibility (χ) measurement is probably caused by the interactions of several magnetic phases. Among them, (La0.6Sr1.4)MnO4 has the largest magnetoresistance ratio ([ρ(H)-ρ(0)]/ρ(0)), which reaches to 78.4% at 48 K. It is not possible to obtain single phase materials with 0.60≤x≤1.00 in the heat treatment temperature range of 1000-1600°C. Impurities were easily observed under SEM and X-ray diffraction patterns. Increasing the heating period and decreasing the temperature, the amount of ABO3 perovskite phase increases. In order to extend the solubility range, of the SrO in the (La2-xSrx)MnO4, it probably needs a higher temperature (>1600°C) and a shorter heat treatment period (<1 h).

Key words：(La2-xSrx)MnO4; Magnetoresistance; K2NiF4 structure; Jahn-Teller effect; Preparation